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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/774,342

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Vishnu G. Kamat

NTI-0848

5321

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02/13/2006

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EXAMINER

WHITMORE, STACY

ART UNIT

PAPER NUMBER

2825

DATE MAILED: 02/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/774,342

Applicant(s)

KAMAT ET AL.

Examiner

Stacy A. Whitmore

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-19 and 21-25 is/are rejected.
- 7) ☒ Claim(s) 12 and 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 25 is rejected under 35 U.S.C. 102(e) as being anticipated by Liebmann (US Patent Application Publication 2004/0096752).

As for the claim, Liebmann discloses the invention as claimed, including

25. A method of manufacturing an alternating phase shifting mask (PSM), the method comprising:

using a software-implemented technique to create a uniform intensity imbalance error on the alternating PSM [paragraphs 0015, 0017, and 0023]; and

using a mask-implemented technique to correct for the uniform intensity imbalance error on the alternating PSM [paragraphs 0015, 0017, and 0023].

Claim 25 is rejected under 35 U.S.C. 102(e) as being anticipated by Liu (US Patent Application Publication 2003/0068564):

As for the claim, Liu discloses the invention as claimed, including

25. A method of manufacturing an alternating phase shifting mask (PSM), the method comprising:
using a software-implemented technique to create a uniform intensity imbalance error on the alternating PSM [paragraphs 0009-0010, 0013, and 0015-0017]; and
using a mask-implemented technique to correct for the uniform intensity imbalance error on the alternating PSM [paragraphs 0009-0010, 0013, and 0015-0017].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-11, 13-19, and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu (US Patent Application Publication 2003/0068564) in view of Pierrat (US Patent Application Publication 2004/0191650).

As for the claims, Liu discloses the invention substantially as claimed, including A method (computer implemented method) of designing an alternating phase shifting mask (PSM), and an alt-PSM, the method comprising:
converting a layout to an alternating PSM design including 0 degree phase shifters and 180 degree phase shifters and minimizing intensity imbalance [paragraphs 0009-0010, 0013, and 0015-0017];

minimizing an intensity imbalance between a 0 degree phase shifter and a 180 degree phase shifter corresponding to the 0 degree phase shifter [paragraphs 0009-0010, 0013, and 0015-0017];

wherein if a 180 degree phase shifter includes a sub-resolution feature, then sizing the blocker in the 0 degree phase shifter to be larger than the sub-resolution feature [paragraph 0181];

performing optical proximity correction (OPC) on the alternating PSM design [paragraph 0015];

wherein performing OPC is done after incorporating blockers in the alternating PSM design [paragraph 00156];

wherein performing OPC is done before incorporating blockers in the alternating PSM design [paragraph 0015];

an undercut in the 180 degree phase shifter [paragraph 0012];

including a bias in the 180 degree phase shifter [paragraph 0029, 0040];

input interface [fig. 5];

output interface [fig. 5];

Liu does not specifically disclose incorporating blockers (sub-resolution features) in the alternating PSM design, wherein a blocker is formed in a 0 degree phase shifter to minimize an intensity imbalance with its corresponding 180 degree phase shifter; growing a length of a blocker; a plurality of blockers; wherein incorporating blockers creates a substantially uniform intensity imbalance error on the alternating PSM

Pierrat discloses blockers wherein a blocker is formed in a 0 degree phase shifter with respect to its corresponding 180 degree phase shifter [paragraphs 0016, 0178, 0181, 0184, fig. 23]; wherein incorporating blockers includes growing (a single dimension) a length of the blocker [paragraph 0181]; wherein incorporating blockers includes forming a plurality of blockers in the 0 degree phase shifter [paragraph 0181]; creating a substantially uniform intensity imbalance error [paragraph 0181 – the addition of sub-

resolution features inherently creates a substantially more uniform intensity imbalance error].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Liu and Pierrat because adding Pierrat's blockers for the purpose of minimizing intensity would have improved Liu's method by allowing for adjustment (lengths; a single dimension) for sub-resolution features in a design having smaller than minimum dimensions and balance intensity imbalance thereby improving feature integrity for mask production [see Pierrat, paragraphs 0181 and 0184].

Claims 12 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to disclose either singularly or in combination a method of designing an alt-PSM and an ALT-PSM comprising at least phase shifter includes a wherein if the 180 degree second sub-resolution feature, then sizing the first sub-resolution feature to be larger than the second sub-resolution feature; and a sub-resolution feature formed in the 180 degree phase shifter, wherein the sub-resolution feature formed in the 0 degree phase shifter is larger than the sub-resolution feature formed in the 180 degree phase shifter.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stacy A. Whitmore whose telephone number is (571) 272-1685. The examiner can normally be reached on Monday-Thursday, alternate Friday 6:30am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Chiang can be reached on (571) 272-7483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stacy A Whitmore
Primary Examiner
Art Unit 2825

A handwritten signature in black ink, appearing to read 'SA Whitmore', is written over the printed name and title.

SAW

February 7, 2006